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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,867	08/18/2006	Srikanth Venkatachari	3502-1109	3778
<div>466                      7590                      10/02/2009</div> <div>YOUNG &amp; THOMPSON</div> <div>209 Madison Street</div> <div>Suite 500</div> <div>ALEXANDRIA, VA 22314</div>				
<div>EXAMINER</div> <div>STIMPERT, PHIL PEARL</div>				
<div>ART UNIT                      PAPER NUMBER</div> <div>3746</div>				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/589,867

**Applicant(s)**

VENKATACHARI ET AL.

**Examiner**

Philip Stimpert

**Art Unit**

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 8/18/06, 10/22/07
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Regarding the claims in general, there are numerous errors with respect to antecedent basis. For instance, in claim 1, line 6, no antecedent basis for the term "the surface level" is provided, and "a liquid" appears to be a second positive recitation after line 2. These errors extend throughout the claims, so the examiner will not provide an exhaustive list. A detailed review of the claims with this requirement in mind is in order.

4. Regarding claim 7, the claim recites "a third value of the rotation speed." However, there is no recitation of a second value of the rotation speed in the dependence chain of claim 7. It is thus unclear whether this claim references elements which are not set forth in the claim, and the claim is therefore indefinite.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-13, and 15-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,481,973 to Struthers (Struthers hereafter) in view of US Patent 4,945,491 to Rishel (Rishel).

7. Regarding claim 1, Struthers teaches a pump station (10) which transfers liquid from a tank (84) and is controlled by an electric drive including a frequency converter (30). Struthers further teaches measuring the level of the liquid with a sensor (70) and controlling the activation of the pump based on the measured level (col. 5, ln. 44-49) and selecting a first level (full tank). Struthers teaches monitoring the moment at which the tank reaches the first value from a predetermined direction and controlling the pump to start its operation. Further, this is accomplished by means of a controller which includes a microprocessor (24) and an inverter (30, or frequency converter). Struthers does not specifically teach selecting a first rotation speed at which the amount of transferred fluid relative to consumed energy is greatest. Rishel teaches a monitor and control system for a pump installation. In particular, Rishel teaches selecting a pump operating condition with maximum efficiency ( $W$  in the equation at the top of col. 7). This efficiency is dimensionless, but the scaling factor ( $K$ ) which removes the dimensions is measured in foot- gallons per minute per kilowatt, which indicates that the efficiency is directly related to the amount of transferred liquid relative to the energy consumed. It is well known in the art that improving the efficiency of a system can reduce the energy require and thereby the cost. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to select as a first operation

speed of the pump of Struthers a speed of maximum efficiency in order to minimize energy used and thus reduce costs.

8. Regarding claim 3, Struthers teaches that the tank (84) is emptied by the pump, and that therefore the predetermined direction is from the bottom toward the top.

9. Regarding claim 4, Struthers teaches selecting separate first and second values of the liquid and running the pump at different speeds accordingly (col. 5, ln. 63 through col. 6, ln. 7). In particular, Struthers teaches allowing a higher speed when the liquid level is higher, which one of ordinary skill would appreciate would allow the system to prevent overflow of the tank.

10. Regarding claim 5, Struthers teaches that the second speed value is a maximum rotation speed (col. 6, ln. 4, "higher maximum speed").

11. Regarding claim 6, Struthers teaches that several pumps may be operated, and may be alternated in operation to wear evenly (col. 6, ln. 29-41).

12. Regarding claim 7, Struthers teaches that a second pump may be operated to increase flow rates (same citation), and that an alarm level of overfill may be reached (112). In such an overfill situation, with a multiple pump installation, it would be obvious to one of ordinary skill in the art that the maximum pumping capability would be required, thus the second or further pumps would be activated at such a condition.

13. Regarding claim 8, Struthers teaches that the predetermined surface level is substantially stored in the frequency converter, inasmuch as the indication from the level sensor (70) which initiates the pump operation is evaluated in the controller (24) and converter (30). Therefore, at least a binary representation of the tank state

indicated by the sensor must be stored or inherently formed in the circuit architecture. Further, Rishel teaches storing flowrate setpoints (Q1, col. 7, ln. 52-55) which one of ordinary skill in the art would appreciate are essentially proportional, and in a VSD type system analogous, to the rotation speed setting.

14. Regarding claim 9, evaluation of the signal from the level sensor (70) is performed by the frequency converter, or controller, and thus the level is measured therein.

15. Regarding claim 10, Struthers teaches providing an alarm signal (col. 7, ln. 30-31, at step 112), and teaches that the pump is controlled on the basis of that signal (col. 8, ln. 64).

16. Regarding claim 11, Struthers teaches that an alarm function (112) is performed when the liquid surface level exceeds a selected alarm limit value.

17. Regarding claim 12, Struthers teaches running the pump in reverse to resuspend solids in the tank (col. 7, ln. 1-23). As this creates a vortex, it will tend to vary the surface level of the liquid, and while the pump is running in reverse, any liquid entering the tank will change the liquid level (hence the need for an updated liquid level in lines 22-23).

18. Regarding claim 13, Struthers teaches a frequency converter (24, 30) and a pump station (10) with a liquid tank (84), pump (54) and electric drive (12). Struthers teaches that the frequency converter (30) and associated controller (22, 24) comprise means for storing a first value of the liquid level (col. 3, ln. 53-56, memory device, liquid level storage indicated by 104 and 112 in Fig. 5A), means for storing a first value of the

rotation speed of the pump (same memory device, speed storage indicated by col. 5, ln. 12-17), means (22, 24) for measuring the liquid level on the basis of a signal received from a sensor (70), means for detecting the moment the liquid surface level reaches the first value (104) from a predetermined direction and means for controlling the rotation speed of the pump (col. 5, ln. 12-17) to the first value of the rotation speed in response to the moment detection. By the combination, the first speed is substantially the most efficient as taught by Rishel and as claimed.

19. Regarding claim 15, Struthers teaches that the tank (84) is emptied by the pump, and that therefore the predetermined direction is from the bottom toward the top.

20. Regarding claim 16, Struthers teaches selecting separate first and second values of the liquid and running the pump at different speeds accordingly (col. 5, ln. 63 through col. 6, ln. 7). In particular, Struthers teaches allowing a higher speed when the liquid level is higher, which one of ordinary skill would appreciate would allow the system to prevent overflow of the tank. The controller (22, 24) and associated frequency converter (30) provide the means to accomplish this.

21. Regarding claim 17, Struthers teaches that the second speed value is a maximum rotation speed (col. 6, ln. 4, "higher maximum speed").

22. Regarding claim 18, Struthers teaches that several pumps may be operated, and may be alternated in operation to wear evenly (col. 6, ln. 29-41).

23. Regarding claim 19, Struthers teaches that the frequency converter (30) comprises means for transmitting control data (col. 6, ln. 19-41) to another pump for controlling the operating turns.

24. Regarding claim 20, Struthers teaches that the frequency converter comprises means (36) for transmitting surface level data to the frequency converter of a second pump (76).
25. Regarding claim 21, Struthers teaches a memory unit (col. 3, ln. 53-61, memory device) for storage of the surface level and speed, as well as a program for controlling the drive.
26. Regarding claim 22, Struthers teaches a measurement unit (22) for receiving a signal from the level sensor (70) and determining the surface level (104, 112) on the basis of the signal.
27. Regarding claim 23, Struthers teaches a terminal (71) for connecting the level sensor (70).
28. Regarding claim 24, Struthers teaches a processor (24) for controlling the electric drive on the basis of a program (as above) that controls the processor.
29. Regarding claim 25, Struthers teaches means (22, 24) for receiving an alarm signal (as in 112) and for controlling the pump on the basis of that signal (as in 112).
30. Regarding claim 26, Struthers teaches means for performing an alarm function (112) if the liquid surface level exceeds an alarm level (col. 7, ln. 29-30).
31. Regarding claim 27, Struthers teaches that the frequency converter comprises software for measurement of the liquid level on the basis of a signal from the sensor and control of the rotation speed of the pump based thereon (102, 104, 118).



32. Claims 2 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Struthers in view of Rishel as applied to claims 1 and 13 above, and further in view of US Patent 2,462,076 to Dryden (Dryden).

33. Struthers in combination with Rishel teaches the inventions of claims 1 and 13 as detailed above. However, Struthers and Rishel both relate to pumping systems which are designed to empty a tank, rather than to fill it. Dryden teaches a system in which a pump is utilized to maintain liquid level in "a container from which fluid is drawn either continuously or periodically," (col. 1, ln. 3-4). The benefits of Struthers as modified by Rishel, such as efficiency, remote control, and reliability, could as easily be obtained by applying their teachings to a system such as Dryden, in order to create an efficient and reliable system of that type. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that the control apparatus and methods of Struthers and Rishel could be used in an apparatus such as that of Dryden, in which a tank is filled by a pump. One of ordinary skill would appreciate that the predetermined direction would perforce be from the top to the bottom in such a system.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/  
Supervisory Patent Examiner, Art  
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/P. S./  
Examiner, Art Unit 3746  
30 September 2009